

FEM 1209.390271, etc

FLOOD INSURANCE STUDY



HOLMES COUNTY, OHIO AND INCORPORATED AREAS



COMMUNITY NAME	COMMUNITY NUMBER
GLENMOUNT VILLAGE OF	390277
HOLMESVILLE VILLAGE OF	390278
KILLBUCK VILLAGE OF	390279
MILLERSBURG VILLAGE OF	390280
UNINCORPORATED AREAS	390276

DECEMBER 15, 1990



Federal Emergency Management Agency

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
HOLMES COUNTY,
OHIO,
AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the geographic area of Holmes County, Ohio, including the Villages of Glenmont, Holmesville, Killbuck, Millersburg, and the Unincorporated Areas of Holmes County (hereinafter referred to collectively as Holmes County) and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

This Flood Insurance Study revises and supersedes a previous Flood Insurance Study for the Village of Killbuck, Ohio and a Flood Insurance Rate Map for the Village of Holmesville, Ohio (References 1, 2). This information will be used by the communities to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program. The information will also be used by local and regional planners to further promote sound land use and floodplain development.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by Burgess & Niple, Ltd. (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-86-C-2251. This study was completed in January 1988.

1.3 Coordination

On January 31, 1986, an initial coordination meeting was held with representatives of the Federal Emergency Management Agency (FEMA), Holmes County, Ohio Department of Natural Resources (ODNR), and the Study Contractor.

A search for data was made at all levels of government, specifically the U.S. Army Corps of Engineers (COE), Huntington District; ODNR; FEMA; U.S. Geological Survey (USGS); Soil Conservation Service (SCS); Muskingum Watershed Conservancy District; and Holmes County. Conrail and the Ohio Department of Transportation (ODOT) were also contacted in order to obtain bridge data to be used in the hydraulic analysis.

On January 9, 1990, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the geographic area of Holmes County, Ohio. The area of study is shown on the Vicinity Map (Figure 1).

Flooding caused by overflow of Black Creek, Doughty Creek, and Killbuck Creek was studied in detail.

Areas having low development potential or minimal flood hazards were previously studied using approximate analyses. The results were shown on the Flood Hazard Boundary Map for Holmes County (Reference 3) and are incorporated into this Flood Insurance Study.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through January 1993. The scope and methods of study were proposed to and agreed upon by FEMA and Holmes County.

2.2 Community Description

Holmes County is in east-central Ohio. It is bordered by Ashland and Knox Counties, Ohio, on the west; Coshocton County, Ohio, on the south; Stark and Tuscarawas Counties, Ohio, on the east; and Wayne County, Ohio, to the north. Major highways in Holmes County are State Routes 39, 60, 62, 83, and 241. The 1980 population for Holmes County was reported to be 29,416 (Reference 4).

The climate of Holmes County is classified as continental. Such a climate is characteristic of a land mass the size of North America and is marked by large annual and day-to-day ranges of temperature. Summers are moderately warm and humid with temperatures equalling or exceeding 90 degrees Fahrenheit (°F) on approximately 14 days. Winters are reasonably cold and cloudy with an average of 4 days having subzero temperatures. Records at Millersburg, Ohio show for the period of 1936 to 1965 a minimum temperature of -27°F and a maximum of 101°F, with a mean annual temperature of 50.8°F. The mean annual precipitation for the county is 38.16 inches (Reference 5).

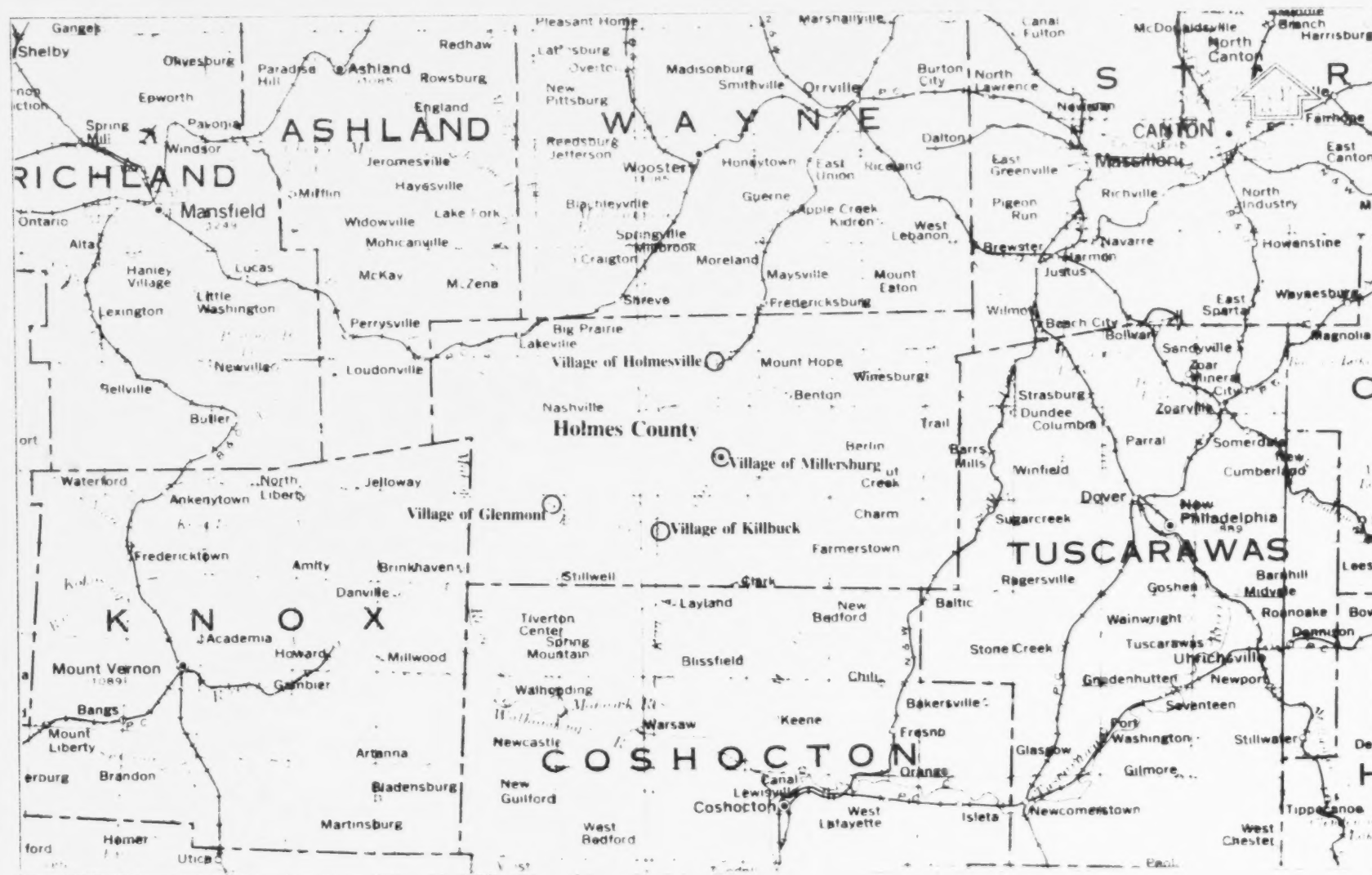


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

**HOLMES COUNTY, OH
AND INCORPORATED AREAS**

APPROXIMATE SCALE

24 MILES

VICINITY MAP

Holmes County is located on the dissected Allegheny Plateau. The northern portion of the county lies in the glaciated area of the plateau, while the southern portion is unglaciated (Reference 6). The soils of Holmes County have been classified into 6 soil associations, with the majority of the county divided equally into either the Gilpin-Keene-Westmoreland Association or the Wooster-Canfield Association. The Gilpin-Keene-Westmoreland Association consists of sloping to very steep, well-drained and moderately well-drained soils underlain by either shale and siltstone or a combination of limestone, shale, and sandstone. The Wooster-Canfield Association consists of mostly sloping to steep, well-drained and moderately well-drained soils (Reference 7).

The majority of Holmes County was once covered by a mixed oak forest consisting mostly of white oak, black oak, and hickory. Today, much of this forest has been cleared (Reference 8).

2.3 Principal Flood Problems

Past flooding on the streams within Holmes County indicates that flooding may occur during any season of the year. Major floods have resulted from intense summer storms, but winter floods may be worsened if the rain is accompanied by melting snow.

Major floods occurred on Killbuck Creek in August 1935, January 1959, and July 1969. The discharges associated with these events at the USGS Killbuck Creek gage at Killbuck, Ohio (No. 3-1390) were 28,800 cubic feet per second (cfs), 28,400 cfs, and 47,500 cfs, respectively. The estimated return periods for floods of these magnitudes are 70 years, 70 years, and 200 years, respectively (Reference 9).

The July 1969 storm is recognized as the most intense and widespread summer storm ever recorded in this portion of Ohio.

2.4 Flood Protection Measures

Flood protection measures are not known to exist within the study area.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any

50-year period is approximately 40-percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60-percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

The 100-year flood frequency peak discharges for Black Creek were determined from the recommended estimating equation presented in Bulletin No. 45 (Reference 9).

The 100-year peak discharges for Doughty Creek were also initially determined from the previously referenced Bulletin No. 45 equation. An adjustment was made on Doughty Creek below the confluence of Sam's Run to account for attenuation in Lake Buckhorn, located on Sam's Run a short distance above its mouth. Peak inflow and outflow data for Lake Buckhorn was obtained from hydrologic analyses made as part of a recent ODNR dam inspection (Reference 10). A linear relationship was assumed between the percentage of drainage area controlled and modified peak flow as a percentage of natural peak flow. While attenuation of the 100-year peak discharge on Sam's Run is quite significant, Lake Buckhorn controls only about 8-percent of the accumulative Doughty Creek drainage area, and the resulting discharge reduction adjustment on Doughty Creek was also 8-percent.

Recent estimates of 100-year peak discharges were available for two locations on Killbuck Creek (References 1 and 11). A log-log plot of 100-year peak discharge versus drainage area was prepared from these two information sources. Discharges for the study reaches were interpolated from the log-log plot.

Peak discharge-drainage area relationships for the 100-year flood of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (SQ. MILES)</u>	<u>PEAK DISCHARGE (CFS)</u>			
		<u>10-YEAR</u>	<u>50-YEAR</u>	<u>100-YEAR</u>	<u>500-YEAR</u>
BLACK CREEK					
about 0.9 mile					
downstream of					
County Route 25	21.1	N/A	N/A	7,870	N/A
just upstream of					
County Route 25	18.4	N/A	N/A	7,500	N/A

TABLE 1 - SUMMARY OF DISCHARGES (Continued)

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (SQ MILES)</u>	<u>PEAK D'SCHARGE (CFS)</u>			
		<u>10-YEAR</u>	<u>50-YEAR</u>	<u>100-YEAR</u>	<u>500-YEAR</u>
BLACK CREEK (cont'd)					
just upstream of State Route 520	11.6	N/A	N/A	5,450	N/A
DOUGHTY CREEK					
just downstream of confluence of Sam's Run	50.3	N/A	N/A	8,210	N/A
just upstream of confluence of Sam's Run	45.2	N/A	N/A	8,170	N/A
just upstream of State Route 83	41.4	N/A	N/A	7,610	N/A
KILLBUCK CREEK					
just downstream of Front Street	462	9,630	23,700	34,300	79,300
just downstream of confluence of Shrimplin Creek	427	9,630	21,600	30,400	67,000
just downstream of confluence of Sand Run	407.7	N/A	N/A	29,000	N/A
just upstream of confluence of Sand Run	398.4	N/A	N/A	28,300	N/A
just downstream of confluence of Sapps Run	393.6	N/A	N/A	28,000	N/A
just upstream of confluence of Sapps Run	385.2	N/A	N/A	27,300	N/A
just upstream of County Route 320	312.9	N/A	N/A	22,000	N/A
just downstream of confluence of Salt Creek	310	N/A	N/A	21,700	N/A
just upstream of confluence of Salt Creek	266	N/A	N/A	18,400	N/A

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Photogrammetry was used to obtain floodplain cross sections and pertinent bridge/roadway profiles. The below-water portion of selected cross sections, as well as waterway openings of pertinent bridges, were field measured. In many cases, these waterway openings were taken from available bridge plans.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and on the Flood Insurance Rate Map.

Roughness coefficients (Manning's "n") for the streams studied were chosen based upon field observations of the stream and floodplain areas. For both Black Creek and Doughty Creek, the channel "n" value was 0.035, while the overbank "n" values ranged from 0.05 to 0.12. The channel "n" values for Killbuck Creek ranged from 0.03 to 0.04, and the overbank "n" values ranged from 0.06 to 0.12.

The water-surface elevations for the Black Creek and Doughty Creek study reaches were computed using the HEC-2 step-backwater computer program (Reference 12). Starting water-surface elevations were determined using the slope-area method of the HEC-2 program.

The 100-year flood profiles on Killbuck Creek were developed using a combination of the depth-frequency and historical floods methods. High-water profiles for the 1913, 1935, and 1969 floods were obtained from the COE (Reference 13).

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close together, due to limitations of the profile scale, only the 100-year profile has been shown.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24000 with a contour interval of 20 feet (Reference 14).

The 100-year and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary was delineated using the Flood Hazard Boundary Map for Holmes County (Reference 3).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways for this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 2, Floodway Data. The computed floodways are shown on the Flood

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
BLACK CREEK								
A	13,920	225	1779	4.4	868.0	868.0	869.0	1.0
B	17,730	220	2019	3.9	873.8	873.8	874.3	0.5
C	19,870	430	1914	2.8	882.5	882.5	882.5	0.0
D	22,710	139	636	8.6	897.8	897.8	898.1	0.3
DOUGHTY CREEK								
A	3,700	235	1316	6.2	827.5	827.5	828.4	0.9
B	5,740	275	1448	5.7	834.2	834.2	834.5	0.3

¹FEET ABOVE ABANDONED RAILROAD

²FEET ABOVE CONFLUENCE OF SAM'S RUN

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

HOLMES COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

BLACK CREEK—DOUGHTY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
KILLBUCK CREEK								
A	4320	1440	17,351	2.0	812.2	812.2	813.2	1.0
B	5500	1360	17,290	2.0	812.4	812.4	813.4	1.0
C	6620	1200	15,838	2.2	812.6	812.6	813.6	1.0
D	7130	1250	14,967	2.3	812.9	812.9	813.9	1.0
E	8100	1400	19,208	1.8	813.3	813.3	814.2	0.9
F	9160	1650	20,527	1.7	813.4	813.4	814.3	0.9
G	9650	1375	13,232	2.6	813.7	813.7	814.7	1.0
H	9780	1300	13,653	2.5	813.7	813.7	814.7	1.0
I	10,270	1030	14,825	2.1	814.1	814.1	815.1	1.0
J	11,350	850	10,904	2.8	814.1	814.1	815.1	1.0
K	12,180	830	10,820	2.8	814.2	814.2	815.2	1.0
L	29.98 ²	590	5267	5.5	819.8	819.8	820.8	1.0
M	30.67 ²	1035	9116	3.2	821.7	821.7	822.7	1.0
N	31.24 ²	1069	8042	3.6	823.5	823.5	824.5	1.0
O	31.88 ²	566	3749	7.7	826.2	826.2	827.2	1.0
P	32.53 ²	1245	10323	2.8	827.6	827.6	828.6	1.0
Q	36.54 ²	772	4040	5.4	836.9	836.9	837.9	1.0
R	36.97 ²	751	3876	5.7	838.2	838.2	839.2	1.0

¹FEET ABOVE CONFLUENCE OF WOLF CREEK

²MILES ABOVE MOUTH

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

HOLMES COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

KILLBUCK CREEK

10

Insurance Rate Map. In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplain will not cause more than a 1.0-foot increase in the base flood elevations at any point within the community.

The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

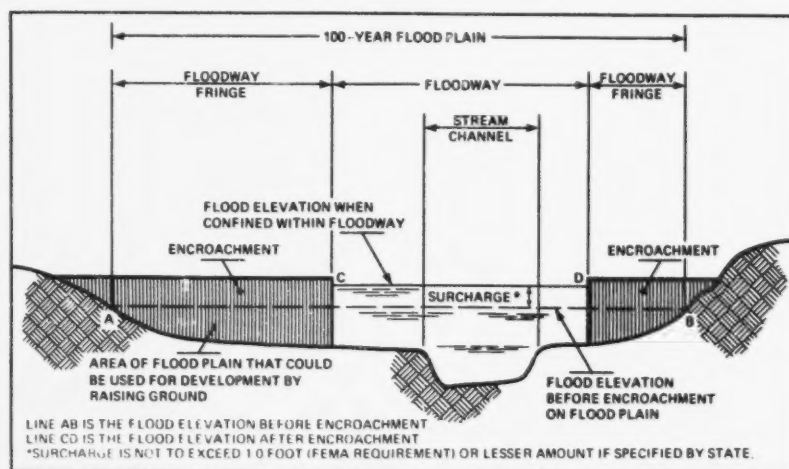


FIGURE 2 - Floodway Schematic

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The current Flood Insurance Rate Map presents flooding information for the geographic area of Holmes County. Previously, separate Flood Hazard Boundary Maps and/or Flood Insurance Rate Maps were prepared for each flood-prone incorporated community and the unincorporated areas of the county. Historical data relating to the maps prepared for each community are presented in Table 3, Community Map History.

7.0 OTHER STUDIES

Flood Insurance Studies published for Coshocton, Knox, Stark, Tuscarawas, and Wayne Counties, Ohio, and the Village of Killbuck, Ohio (References 15, 16, 17, 18, 11, 1) agree with this study.

Flood Insurance Rate Maps printed for Ashland County, Ohio, the Village of Holmesville, Ohio, and the Village of Baltic, Ohio (References 19, 2, and 20) agree with this study.

This Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for Holmes County, Ohio (Reference 3).

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
GLENMONT, VILLAGE OF	OCTOBER 29, 1976		DECEMBER 15, 1990	
HOLMESVILLE, VILLAGE OF	MARCH 22, 1974	JULY 30, 1976	SEPTEMBER 1, 1986	
KILLBUCK, VILLAGE OF	MAY 3, 1974	MAY 21, 1976	FEBRUARY 5, 1986	
MILLERSBURG, VILLAGE OF	FEBRUARY 1, 1974	MAY 21, 1976	DECEMBER 15, 1990	
UNINCORPORATED AREAS	JANUARY 20, 1978		DECEMBER 15, 1990	

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

**HOLMES COUNTY, OH
AND INCORPORATED AREAS**

COMMUNITY MAP HISTORY

3

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 175 West Jackson Boulevard, 4th Floor, Chicago, Illinois 60604-2698.

Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To ensure that any user is aware of all revisions, it is advisable to contact the map repository of flood hazard data located in the community.

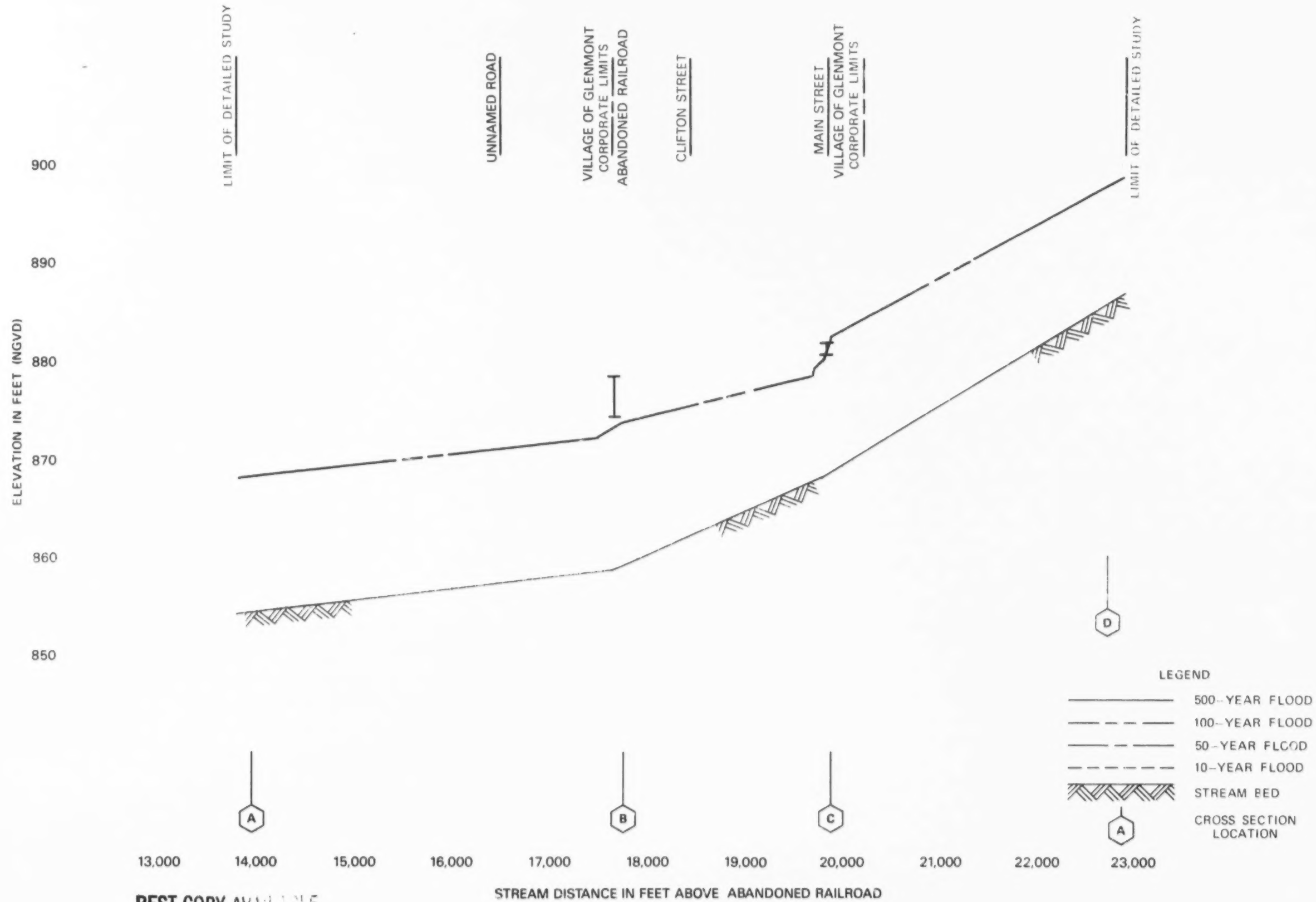
9.0 REFERENCES AND BIBLIOGRAPHY

1. -----, Flood Insurance Study, Village of Killbuck, Holmes County, Ohio, February 1986.
2. -----, Flood Insurance Rate Map, Village of Holmesville, Holmes County, Ohio, September 1986.
3. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Holmes County, Unincorporated Areas, Ohio, January 1978.
4. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Ohio, Washington, D.C., 1982.
5. Ohio Department of Natural Resources, Division of Water, Climatic Guide for Selected Locations in Ohio, Marvin E. Miller.
6. -----, Division of Geological Survey, Ohio - An American Heartland, Bulletin 65, 1975.
7. -----, Division of Lands and Soil, A General Soil Map of Holmes County, 1975.
8. The Ohio State University, Ohio Biological Survey, The Natural Vegetation of Ohio in Pioneer Days, Robert B. Gordon, 1966.
9. Ohio Department of Natural Resources, Division of Water, Bulletin No. 45, Floods in Ohio, Magnitude and Frequency, May 1977.
10. -----, Division of Water, Dam Inspection Report, Lake Buckhorn Dam, Holmes County, January 1987.
11. U.S. Department of Agriculture, Soil Conservation Service, Killbuck Creek Flood Hazard Study, Wayne County, Ohio, Columbus, Ohio, August 1982.
12. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis, California, April 1984.

13. ———, Huntington District, Muskingum River Basin, Ohio, Killbuck Creek High Water Profiles, July 1969 Flood, April 1970.
14. U.S. Geological Survey, 7.5 Minuter Series Topographic Maps, Scale 1:24000, Contour Interval 20 feet: Glenmont, Ohio (1962); Holmesville, Ohio (1961); Millersburg, Ohio (1985); Killbuck, Ohio (1985).
15. Federal Emergency Management Agency, Flood Insurance Study, Coshocton County, Unincorporated Areas, Ohio, February 1987.
16. ———, Flood Insurance Study, Knox County, Unincorporated Areas, Ohio, January 1982.
17. ———, Flood Insurance Study, Stark County, Unincorporated Areas, Ohio, September 1983.
18. ———, Flood Insurance Study, Tuscarawas County, Unincorporated Areas, September 1987.
19. ———, Flood Insurance Study, Wayne County and Incorporated Areas, Ohio, May 1989.
20. ———, Flood Insurance Rate Map, Ashland County, Unincorporated Areas, Ohio, January 1988.
21. ———, Flood Insurance Rate Map, Village of Baltic, Tuscarawas County, Ohio, June 1988.

ELEVATION REFERENCE MARKS

<u>REFERENCE MARK</u>	<u>FLOOD INSURANCE RATE MAP PANEL</u>	<u>ELEVATION (FEET NGVD)</u>	<u>DESCRIPTION OF LOCATION</u>
1	0030	839.95	top north end of east abutment of County Route 320 bridge over Killbuck Creek
2	0040	931.79	top of wingwall at north corner of 4-foot box culvert under State Route 83 located approximately 1 mile north of intersection of State Route 39 and State Route 83
3	0085	880.90	top of north end of east abutment of Main Street bridge over Black Creek
4	0085	869.35	top of south end of backwall of east abutment of abandoned railroad bridge located approximately 1,100 feet southeast of intersection of Depot Street and Galatian Street
5	0105	807.92	a chiseled square on northeast corner of rail seat located at northwest corner of Main Street and Spring Street
6	0105	812.04	a chiseled square located on southeast corner of parapet wall of Front Street bridge over Killbuck Creek
7	0105	809.94	a chiseled square located 2 feet northwest of corner of northwest abutment of abandoned railroad bridge over Killbuck Creek
8	0105	826.48	top of south end of west abutment of State Route 39 bridge over Sapps Run
9	0120	830.60	standard tablet stamped "78 FPV 1959 831." set in concrete base of gas pump located approximately 1,500 feet south of the intersection of State Route 83 and County Route 19



BEST COPY AVAILABLE

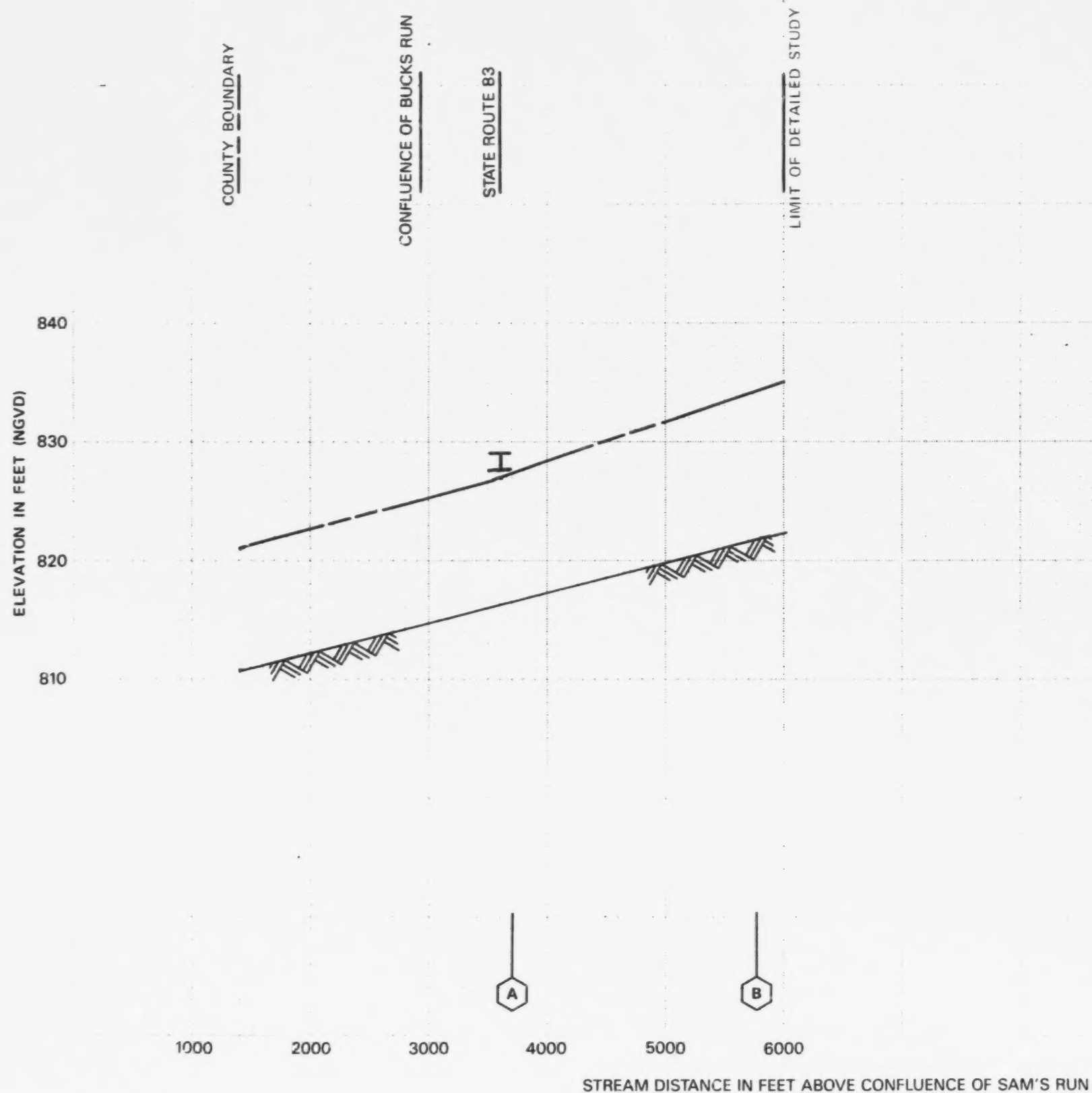
FEDERAL EMERGENCY MANAGEMENT AGENCY

HOLMES COUNTY, OH
AND INCORPORATED AREAS

FLOOD PROFILES

BLACK CREEK

04P

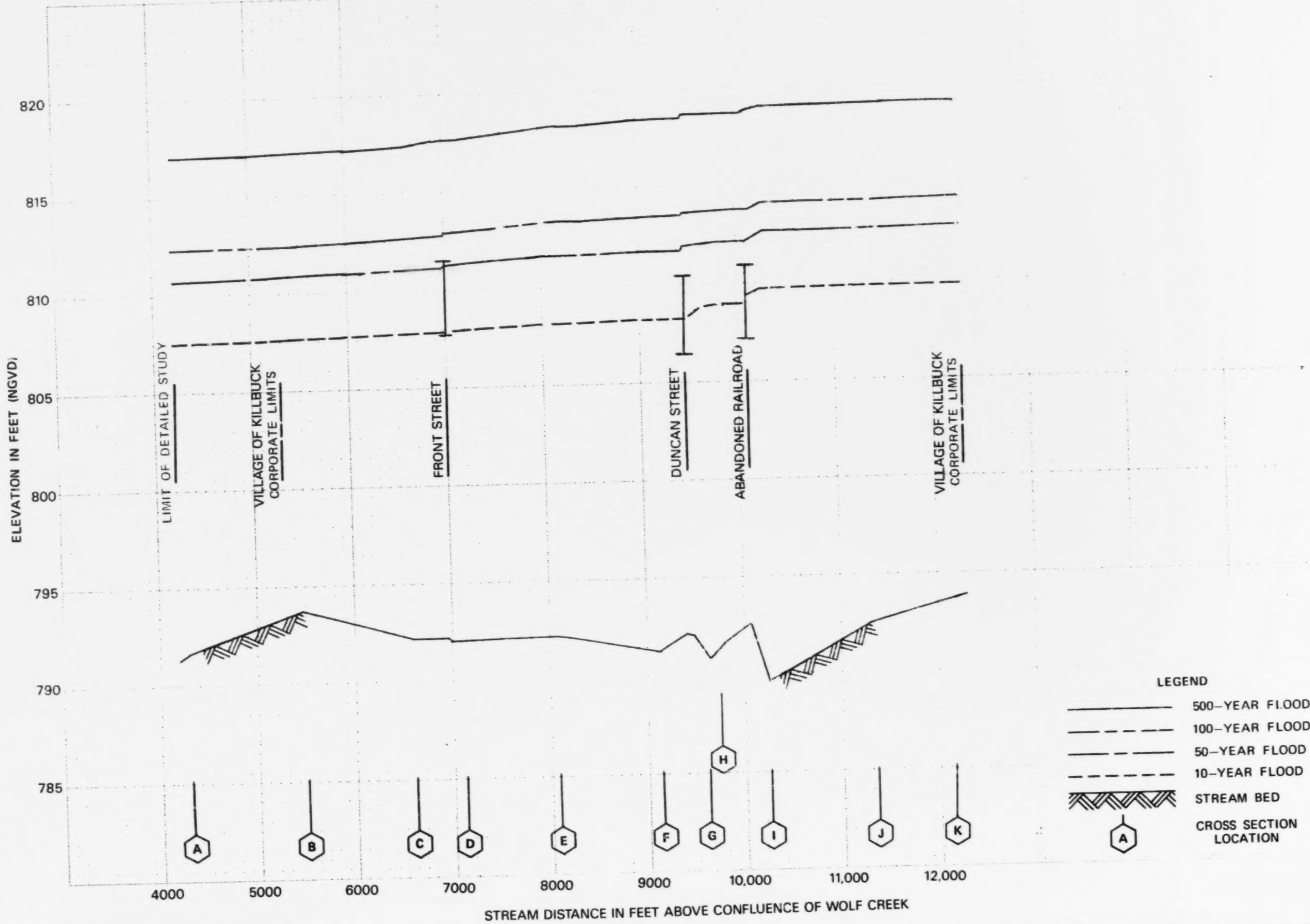


FLOOD PROFILES

DOUGHTY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
HOLMES COUNTY, OH
AND INCORPORATED AREAS

02P



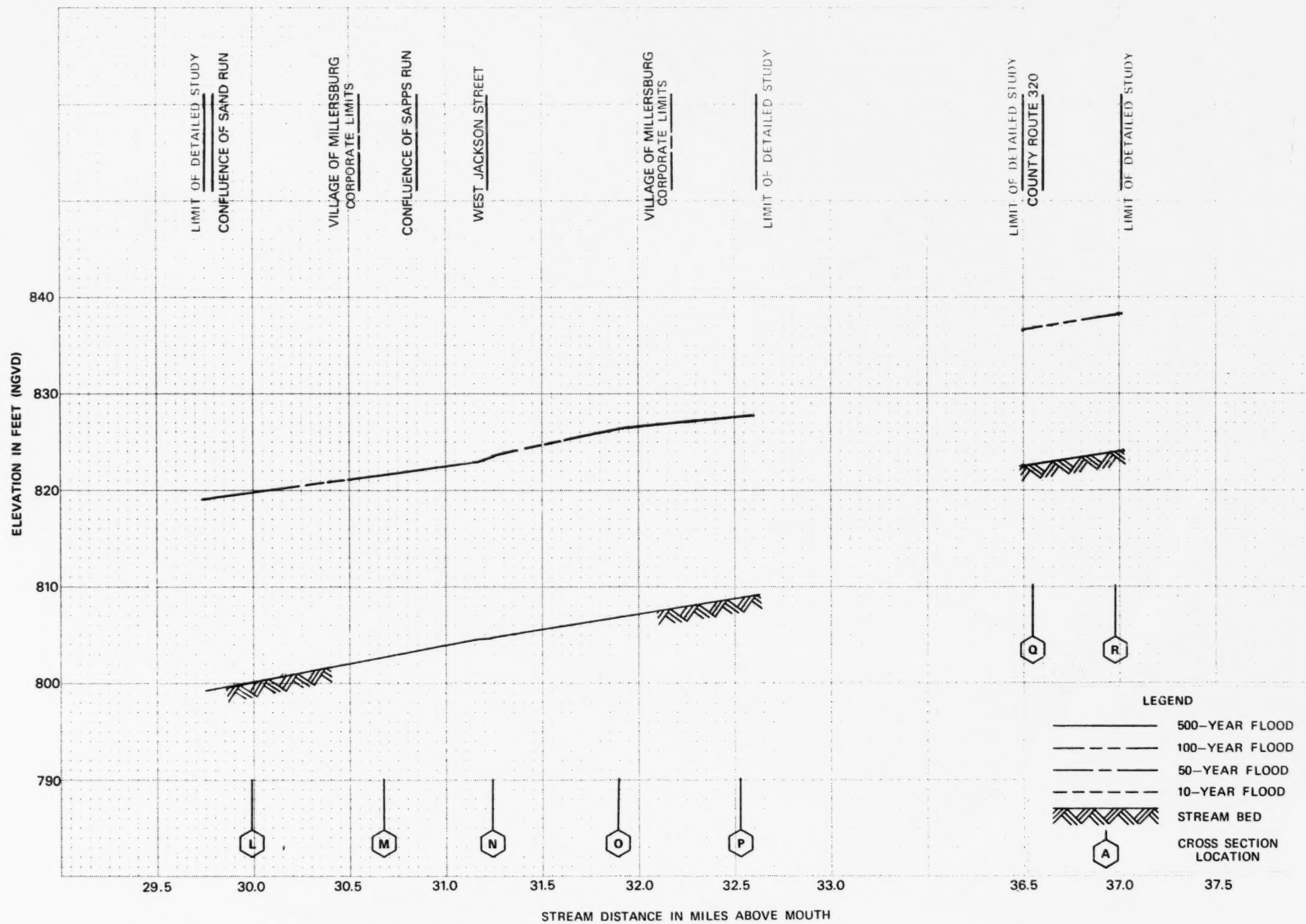
FLOOD PROFILES

KILLBUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HOLMES COUNTY, OH
AND INCORPORATED AREAS

03P



FLOOD PROFILES

KILLBUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HOLMES COUNTY, OH
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